

MUHAMMAD SYAFIQ BIN AZIZ

BACHELOR OF SURVEYING SCIENCE AND GEOMATICS (HONOURS)

JULY 2024

INVESTIGATING THE INFLUENCE OF PLASTICS  
ENCLOSURE ON THE POSITIONING ACCURACY OF  
GNSS RECEIVER

MUHAMMAD SYAFIQ BIN AZIZ

2022830656



SCHOOL OF GEOMATICS SCIENCE AND NATURAL RESOURCES  
COLLEGE OF BUILT ENVIRONMENT  
UNIVERSITI TEKNOLOGI MARA MALAYSIA

JULY 2024

**INVESTIGATING THE INFLUENCE OF PLASTICS  
ENCLOSURE ON THE POSITIONING ACCURACY OF  
GNSS RECEIVER**

**MUHAMMAD SYAFIQ BIN AZIZ  
2022830656**



**Thesis submitted to the Universiti Teknologi MARA Malaysia  
in partial fulfilment for the award of the degree of the  
Bachelor of Surveying Science and Geomatics (Honours)**

**JULY 2024**

## **DECLARATION**

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

In the event that my project/dissertation be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree of the Bachelor of Surveying Science and Geomatics (Honours) and agree be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

Name of Student : MUHAMMAD SYAFIQ BIN AZIZ  
Student's ID No : 2022830656  
Project/Dissertation Title : INVESTIGATING THE INFLUENCE OF PLASTICS  
ENCLOSURE ON THE POSITIONING ACCURACY  
OF GNSS RECEIVER  
Signature and Date :

Approved by:

I certify that I have examined the student's work and found that they are in accordance with the rules and regulations of the School and University and fulfils the requirements for the award of the degree of Bachelor of Surveying Science and Geomatics (Honours).

Name of Supervisor : SIR MOHAMAD ASRUL BIN MUSTAFAR  
Signature and Date :

## ABSTRACT

Global Navigation Satellite System (GNSS) provide an accuracy data and rely heavily on precise time measurements. During rainy day, many users employ plastic enclosures to shield GNSS receivers from wet due to the receiver is not waterproof and the users are not confidence the instrument is waterproof. The aim of this research is made to investigate the significant effect on positioning when receiver covered by plastic. The study will identify and select various types of plastic material used in GNSS receiver enclosures, considering aspect thickness. Next, multiple techniques of positioning (Network RTK, Network Static) will be deployed to identify the effect of plastic. The result from the shows that all selection of plastics used have less effect on the accuracy assessment which umbrella is the lowest. It is considering the shape of umbrella itself which is force the water to fall down which make the water cannot block the receiver from signal. The study offers practical insights for surveyors and professionals who rely on GNSS technology, emphasizing the benefits of using plastic enclosures to maintain accuracy during rainy surveying work. Understanding the impact of plastic enclosures on GNSS survey accuracy is crucial, the plastics can be used but need to have extra attention and aware with accuracy that can be decrease, especially with the type of garbage bag and for heighting.

Keyword:

Global Navigation Satellite System (GNSS), Plastic enclosure, accuracy

## LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
1.4.1	Research Chart Methodology	4
1.5.1	UiTM Arau Perlis	5
1.5.2	Pillar UiTM Arau Perlis	5
3.1	Research Chart Methodology	19
3.2.1	Bubble wrap enclose the receiver	21
3.2.2	Bucket enclose the receiver	22
3.2.3	Garbage bag enclose the receiver	23
3.2.4	Singlet plastic bag enclose the receiver	24
3.2.5	Umbrella enclose the receiver	25
3.2.6	Zip lock enclose the receiver	26
3.4.1.1	Mean Calculation for Latitude, Longitude and Ellipsoidal Height Component	28
3.4.1.2	Formula to Calculate Residual	28
3.4.1.3	Formula to Calculate Root Mean Square (RMS) for residual	28
4.1.1 (a)	The Comparison in Meter Between Dry and Wet Bubble Wrap	33
4.1.1 (b)	The Comparison in Meter Between Dry and Wet Bubble Wrap	34
4.1.2 (a)	The Comparison in Meter Between Dry and Wet Bucket	35
4.1.2 (b)	The Comparison in Meter Between Dry and Wet bucket	36
4.1.3 (a)	The Comparison in Meter Between Dry and Wet garbage bag	38
4.1.3 (b)	The Comparison in Meter Between Dry and Wet garbage bag	39
4.1.4 (a)	The Comparison in Meter Between Dry and Wet singlet plastic bag	40